

REMARKS

In this Response, Applicants amend claims 9, 14 and 15 to correct clerical mistakes. No new matter has been added.

Claims 1-15 are currently pending, of which claims 1, 9 and 14 are independent. Applicants respectfully submit that all of the pending claims are in condition for allowance.

I. Objection to the Specification

The specification is objected to because the title of the claimed invention is allegedly not descriptive. See Office Action, page 2.

Applicants replace the title with a new title: “Fuel Cell Having Inlet and Outlet Buffers.” No new matter has been added. Accordingly, Applicants respectfully request reconsideration and withdrawal of the above objection to the specification.

II. Claim Rejection under 35 U.S.C. § 103(a)

Claims 1-15 are rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent Publication No. 2001/0044042 to Inoue et al. (hereafter “Inoue”) in view of U.S. Patent Publication No. 2003/0129475 to Enjoji et al. (hereafter “Enjoji”) and Japanese Patent Publication No. 2000-164230 to Sha et al. (hereafter “Sha”) (Office Action, page 3). Applicants respectfully traverse the 35 U.S.C. § 103(a) rejection of claims 1-15 for the reasons set forth below.

A. Claim 1

Applicants respectfully submit that the Inoue, Enjoji and Sha references, alone or in any combination, fail to teach or suggest at least the following feature of independent claim 1: “a coolant flow field including two or more inlet buffers separate from each other connected to said coolant supply passage, two or more outlet buffers separate from each other connected to said coolant discharge passage.”

In exemplary embodiments, the claimed invention provides a coolant supply passage and a coolant discharge passage that extend through a fuel cell in a stacking direction. The claimed invention also provides a coolant flow field having two or more inlet buffers separate from each other and connected to the coolant supply passage, and two or more outlet buffers separate from each other and connected to the coolant discharge passage. That is, each of the inlet buffers is directly connected to the coolant supply passage, and each of the outlet buffers is directly connected to the coolant discharge passage. The claimed invention is able to achieve a uniform distribution of coolant to the flow grooves of the coolant flow field by providing two or more inlet buffers connected to the coolant supply passage, as recited in claim 1.

The Inoue reference discusses a sealant for sealing a solid polymer electrolyte membrane in a fuel cell (Inoue, title). The fuel cell includes an anode side diffusion electrode having an anode electrode and a first gas diffusion layer, and a cathode side diffusion electrode having a cathode electrode and a second gas diffusion layer (Inoue, paragraph [0013]). A pair of separators holds the membrane electrode assembly (Inoue, paragraph [0013]). A seal is provided onto the separators (Inoue, paragraph [0013]). The seal makes contact with at least one of the end faces of the first gas diffusion layer and the second gas diffusion layer (Inoue, paragraph [0013]).

However, the Inoue reference does not teach or suggest “a coolant flow field including two or more inlet buffers separate from each other connected to said coolant supply passage, two or more outlet buffers separate from each other connected to said coolant discharge passage,” as recited in claim 1. The Inoue reference is silent with regard to inlet buffers or outlet buffers. The Examiner acknowledges that the Inoue reference does not teach or suggest inlet and outlet buffers for any of the fluid passages in the fuel cell (Office Action, page 4).

The addition of the Enjoji reference fails to cure the shortcomings of the Inoue reference in teaching or suggesting “a coolant flow field including two or more inlet buffers separate from each other connected to said coolant supply passage, two or more outlet buffers separate from each other connected to said coolant discharge passage,” as recited in claim 1.

The Enjoji reference discusses first and second metal sheet separators provided in a fuel cell (Enjoji, abstract). The Enjoji reference discusses that the fuel gas passage, the oxygen-

containing gas passage and the coolant passage are in the form of passage grooves defined in the surfaces of the separators (Enjoji, paragraph [0007]). The passage grooves extend from passage inlets to passage outlets (Enjoji, paragraph [0007]). The Enjoji reference mentions that buffer areas need to be provided around the passage inlets and outlets if the passage inlets and outlets take the form of small openings (Enjoji, paragraph [0008]).

However, the Enjoji reference does not teach or suggest “a coolant flow field including two or more inlet buffers separate from each other connected to said coolant supply passage, two or more outlet buffers separate from each other connected to said coolant discharge passage,” as recited in claim 1. Although the Enjoji reference generally mentions buffer areas provided around passage inlets and outlets, the Enjoji reference still does not teach or suggest two or more inlet buffers separate from each other. In addition, the Enjoji reference does not teach or suggest two or more outlet buffers separate from each other. The Examiner acknowledges that the Enjoji reference does not teach or suggest buffers which are separate from each other (Office Action, page 4).

The addition of the Sha reference fails to cure the shortcomings of the Inoue and Enjoji references in teaching or suggesting “a coolant flow field including two or more inlet buffers separate from each other connected to said coolant supply passage, two or more outlet buffers separate from each other connected to said coolant discharge passage,” as recited in claim 1.

The Sha reference discusses a conduction slot 10 (Sha, Figures 1 and 2 and related text). The conduction slot 10 includes an entrance-side conduction slot 11 which is disposed between a gas entrance 3 and flow grooves of the conduction slot 10 (Sha, Figures 1 and 2 and related text). The conduction slot 10 also includes an outlet-side conduction slot 12 which is disposed between the flow grooves of the conduction slot 10 and a gas outlet 2 (Sha, Figures 1 and 2 and related text). The conduction slot 10 further includes clinch slots 13a-d, each of which connects a first flow groove portion of the conduction slot to a second flow groove portion of the conduction slot (Sha, Figures 1 and 2 and related text).

However, the Sha reference does not teach or suggest “a coolant flow field including two or more inlet buffers separate from each other connected to said coolant supply passage, two or more outlet buffers separate from each other connected to said coolant discharge passage,” as

recited in claim 1. The Sha reference discusses a single entrance-side conduction slot 11 connected to the gas entrance 3. In contrast, claim 1 requires two or more inlet buffers connected to a coolant supply passage. The Sha reference is silent with regard to more than one entrance-side conduction slot. As such, the Sha reference does not teach or suggest two or more inlet buffers separate from each other connected to a coolant supply passage, as required by claim 1. In addition, the Sha reference discusses a single outlet-side conduction slot 12 connected to the gas outlet 2. In contrast, claim 1 requires two or more outlet buffers connected to a coolant discharge passage. The Sha reference is silent with regard to more than one outlet-side conduction slot. As such, the Sha reference does not teach or suggest two or more outlet buffers separate from each other connected to a coolant discharge passage, as required by claim 1.

Because the Sha system includes a single entrance-side conduction slot 11 connected to the gas entrance 3, the gas is not evenly distributed to the flow grooves in the conduction slot 10. In contrast, the claimed invention is able to achieve a uniform distribution of coolant to the flow grooves of the coolant flow field by providing two or more inlet buffers connected to the coolant supply passage, as recited in claim 1. The Sha reference does not motivate achieving uniform distribution of the gas to the flow grooves by using two or more inlet buffers connected to the gas entrance 3.

The clinch slots 13a-d of the Sha reference are also not analogous to the inlet/outlet buffers recited in claim 1, because the clinch slots are not connected to a coolant supply passage or to a coolant discharge passage. Each of the clinch slots 13a-d is **connected to a first flow groove portion and a second flow groove portion** of the conduction slot 10. None of the clinch slots 13a-d is connected to either the gas entrance 3 or the gas outlet 2. Thus, the clinch slots 13a-d are not analogous to an inlet buffer **connected to a coolant supply passage**, or to an outlet buffer **connected to a coolant discharge passage**, as required by claim 1.

For at least the reasons set forth above, Applicants respectfully submit that the Inoue, Enjoji and Sha references, alone or in any combination, fail to teach or suggest each and every feature of claim 1. Accordingly, Applicants respectfully request reconsideration and withdrawal of the above 35 U.S.C. § 103(a) rejection of claim 1.

B. Claims 2-8

Claims 2-8 depend from independent claim 1 and, as such, include all of the features of claim 1. For at least the reasons set forth above in connection with claim 1, Applicants respectfully submit that the Inoue, Enjoji and Sha references, alone or in any combination, fail to teach or suggest each and every feature of claims 2-8. Accordingly, Applicants respectfully request reconsideration and withdrawal of the above 35 U.S.C. § 103(a) rejection of claims 2-8.

C. Claim 9

Applicants respectfully submit that the Inoue, Enjoji and Sha references, alone or in any combination, fail to teach or suggest at least the following feature of independent claim 9: “coolant flow field includes two or more inlet buffers separate from each other connected to said coolant supply passage through inlet connection passages, two or more outlet buffers separate from each other connected to said coolant discharge passage through outlet connection passages.”

For at least the reasons set forth above in connection with claim 1, Applicants respectfully submit that the Inoue, Enjoji and Sha references, alone or in any combination, fail to teach or suggest the above feature of claim 9. Accordingly, Applicants respectfully request reconsideration and withdrawal of the above 35 U.S.C. § 103(a) rejection of claim 9.

D. Claims 10-13

Claims 10-13 depend from independent claim 9 and, as such, include all of the features of claim 9. For at least the reasons set forth above in connection with claim 9, Applicants respectfully submit that the Inoue, Enjoji and Sha references, alone or in any combination, fail to teach or suggest each and every feature of claims 10-13. Accordingly, Applicants respectfully request reconsideration and withdrawal of the above 35 U.S.C. § 103(a) rejection of claims 10-13.

E. Claim 14

Applicants respectfully submit that the Inoue, Enjoji and Sha references, alone or in any combination, fail to teach or suggest at least the following feature of independent claim 14: “a coolant flow field including two or more inlet buffers separate from each other connected to said coolant supply passage, two or more outlet buffers separate from each other connected to said coolant discharge passage.”

For at least the reasons set forth above in connection with claim 1, Applicants respectfully submit that the Inoue, Enjoji and Sha references, alone or in any combination, fail to teach or suggest the above feature of claim 14. Accordingly, Applicants respectfully request reconsideration and withdrawal of the above 35 U.S.C. § 103(a) rejection of claim 14.

F. Claim 15

Claim 15 depends from independent claim 14 and, as such, includes all of the features of claim 14. For at least the reasons set forth above in connection with claim 14, Applicants respectfully submit that the Inoue, Enjoji and Sha references, alone or in any combination, fail to teach or suggest each and every feature of claim 15. Accordingly, Applicants respectfully request reconsideration and withdrawal of the above 35 U.S.C. § 103(a) rejection of claim 15.

CONCLUSION

In view of the foregoing amendments and remarks, Applicants believe that the pending application is in condition for allowance. Should the Examiner feel that a teleconference would expedite the prosecution of this application, the Examiner is urged to contact Applicants' attorney at (617) 227-7400.

Any fee due is authorized to be charged to our Deposit Account No. 12-0080, under Order No. TOW-108US from which the undersigned is authorized to draw. If a requisite petition does not accompany this response, the undersigned hereby petitions under 37 C.F.R. § 1.136(a) for an extension of time for as many months as are required to render this submission timely.

Dated: April 6, 2009

Respectfully submitted,

Electronic signature: / Anthony A. Laurentano /
Anthony A. Laurentano

Registration No.: 38,220

LAHIVE & COCKFIELD, LLP

One Post Office Square
Boston, Massachusetts 02109-2127
(617) 227-7400 (Tel.)
(617) 742-4214 (Fax)
Attorney/Agent for Applicants